Otago Exercise Program (general population)

Health Care: Falls Prevention for Older Adults

Benefit-cost estimates updated December 2019. Literature review updated January 2018.

Current estimates replace old estimates. Numbers will change over time as a result of model inputs and monetization methods.

The WSIPP benefit-cost analysis examines, on an apples-to-apples basis, the monetary value of programs or policies to determine whether the benefits from the program exceed its costs. WSIPP's research approach to identifying evidence-based programs and policies has three main steps. First, we determine "what works" (and what does not work) to improve outcomes using a statistical technique called meta-analysis. Second, we calculate whether the benefits of a program exceed its costs. Third, we estimate the risk of investing in a program by testing the sensitivity of our results. For more detail on our methods, see our Technical Documentation.

Program Description: The Otago Exercise Program is an individually tailored, home-based, strength and balance retraining program for community-dwelling older adults. The goal of the Otago Exercise Program is to prevent falls. The program is typically provided by a physiotherapist who teaches the exercise program to participants in their homes and provides a "prescription" for the exercise program to be independently practiced three times per week. The exercises are tailored to participants' needs and capabilities and consist of strength and balance exercises using ankle cuff weights. Physiotherapists typically provide four home visits over the first two months in the program and make monthly follow up calls to participants through the next four months.

This analysis includes participants from a general population of community-dwelling older adults. All included studies took place in New Zealand. We conducted a separate analysis on the Otago Exercise Program for community-dwelling older adults at high risk for falls.

Benefit-Cost Summary Statistics Per Participant

Benefits to:

Taxpayers	$537
Participants	$68
Others	$84
Indirect	$3,128
Total benefits	$3,816
Net program cost	($661)
Benefits minus cost	$3,155

Benefit to cost ratio	$5.78
Benefits minus costs	$3,155
Chance the program will produce benefits greater than the costs	100 %

The estimates shown are present value, life cycle benefits and costs. All dollars are expressed in the base year chosen for this analysis (2018). The chance the benefits exceed the costs are derived from a Monte Carlo risk analysis. The details on this, as well as the economic discount rates and other relevant parameters are described in our Technical Documentation.

Detailed Monetary Benefit Estimates Per Participant

Benefits from changes to:[1]	Benefits to:				
	Participants	Taxpayers	Others[2]	Indirect[3]	Total
Health care associated with falls	$68	$537	$84	$268	$956
Mortality associated with falls	$0	$0	$0	$3,190	$3,190
Adjustment for deadweight cost of program	$0	$0	$0	($330)	($330)
Totals	$68	$537	$84	$3,128	$3,816

[1]In addition to the outcomes measured in the meta-analysis table, WSIPP measures benefits and costs estimated from other outcomes associated with those reported in the evaluation literature. For example, empirical research demonstrates that high school graduation leads to reduced crime. These associated measures provide a more complete picture of the detailed costs and benefits of the program.

[2]"Others" includes benefits to people other than taxpayers and participants. Depending on the program, it could include reductions in crime victimization, the economic benefits from a more educated workforce, and the benefits from employer-paid health insurance.

[3]"Indirect benefits" includes estimates of the net changes in the value of a statistical life and net changes in the deadweight costs of taxation.

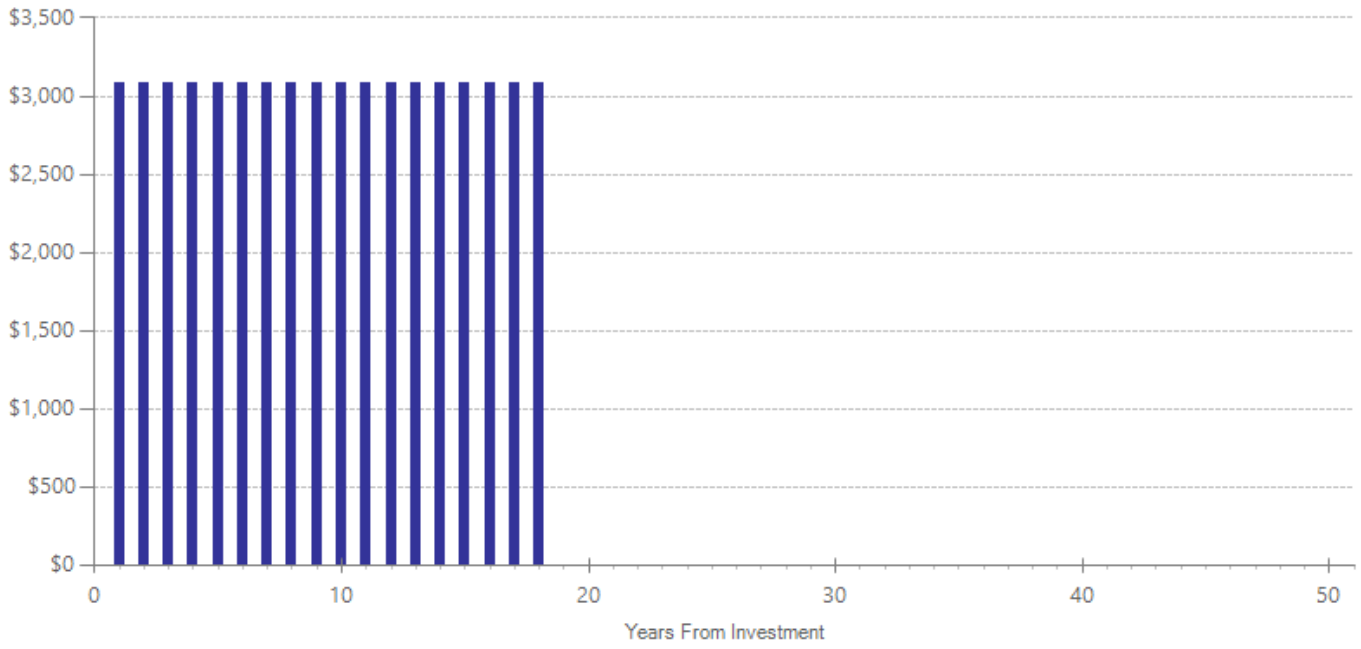
Detailed Annual Cost Estimates Per Participant

	Annual cost	Year dollars	Summary	
Program costs	$627	2016	Present value of net program costs (in 2018 dollars)	($661)
Comparison costs	$0	2016	Cost range (+ or -)	20 %

Per-participant cost estimates are based on weighted average program costs in the included studies. We estimate provider hours including home visiting hours, transportation, telephone contacts, and training hours; apply the 2016 mean hourly wage estimate for Washington State reported by the Bureau of Labor Statistics (retrieved March 2018) for physical therapists; and increase wages by a factor of 1.441 to account for the cost of employee benefits. The included studies averaged 4.5 home visiting hours. We include four hours of travel time and 0.75 hours of telephone follow-up, per participant. We include a $35 online training fee, three hours of provider time to complete the training, and assume that each trained provider serves 20 participants. We also include the cost of a single set of ankle cuff weights for each participant. Information on provider types, transportation, and telephone follow up retrieved from Carande-Kulis, V., Stevens, J.A., Florence, C.S., Beattie, B.L., & Arias, I. (2015). A cost–benefit analysis of three older adult fall prevention interventions. Journal of Safety Research, 52, 65-70. Information on online training costs and ankle cuff weights provided by Carolyn Ham at the Washington State Department of Health, March 2018.

The figures shown are estimates of the costs to implement programs in Washington. The comparison group costs reflect either no treatment or treatment as usual, depending on how effect sizes were calculated in the meta-analysis. The cost range reported above reflects potential variation or uncertainty in the cost estimate; more detail can be found in our Technical Documentation.

Detailed Annual Cost Estimates Per Participant



The graph above illustrates the estimated cumulative net benefits per-participant for the first fifty years beyond the initial investment in the program. We present these cash flows in non-discounted dollars to simplify the "break-even" point from a budgeting perspective. If the dollars are negative (bars below $0 line), the cumulative benefits do not outweigh the cost of the program up to that point in time. The program breaks even when the dollars reach $0. At this point, the total benefits to participants, taxpayers, and others, are equal to the cost of the program. If the dollars are above $0, the benefits of the program exceed the initial investment.

Meta-Analysis of Program Effects

Outcomes measured	Treatment age	No. of effect sizes	Treatment N	Adjusted effect sizes and standard errors used in the benefit-cost analysis						Unadjusted effect size (random effects model)	
				First time ES is estimated			Second time ES is estimated				
				ES	SE	Age	ES	SE	Age	ES	p-value
Falls‡	82	2	225	0.638	0.064	82	1.000	0.000	83	0.638	0.001

‡The effect size for this outcome indicates an incidence rate ratio (IRR), not a standardized mean difference effect size. An IRR less than one indicates a lower rate of the outcome in the treatment group relative to the comparison group; an IRR greater than one indicates a higher rate of the outcome. The treatment n for this outcome represents person-years.

Meta-analysis is a statistical method to combine the results from separate studies on a program, policy, or topic in order to estimate its effect on an outcome. WSIPP systematically evaluates all credible evaluations we can locate on each topic. The outcomes measured are the types of program impacts that were measured in the research literature (for example, crime or educational attainment). Treatment N represents the total number of individuals or units in the treatment group across the included studies.

An effect size (ES) is a standard metric that summarizes the degree to which a program or policy affects a measured outcome. If the effect size is positive, the outcome increases. If the effect size is negative, the outcome decreases.

Adjusted effect sizes are used to calculate the benefits from our benefit cost model. WSIPP may adjust effect sizes based on methodological characteristics of the study. For example, we may adjust effect sizes when a study has a weak research design or when the program developer is involved in the research. The magnitude of these adjustments varies depending on the topic area.

WSIPP may also adjust the second ES measurement. Research shows the magnitude of some effect sizes decrease over time. For those effect sizes, we estimate outcome-based adjustments which we apply between the first time ES is estimated and the second time ES is estimated. We also report the unadjusted effect size to show the effect sizes before any adjustments have been made. More details about these adjustments can be found in our Technical Documentation.

Citations Used in the Meta-Analysis

Campbell, A.J., Robertson, M.C., Gardner, M.M., Norton, R.N., Tilyard, M.W., & Buchner, D.M. (1997). Randomised controlled trial of a general practice programme of home based exercise to prevent falls in elderly women. *Bmj: British Medical Journal, 315* (7115), 1065-9.

Robertson, M.C., Devlin, N., Gardner, M.M., & Campbell, A.J. (2001). Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 1: Randomised controlled trial. *Bmj, 322* (7288), 697.

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Printed on 10-23-2020